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ENZOOTIC ABORTION OF EWES

Comparative Studies of Different Vaccines

BY

A. D. McEWEN AND A. FOGGIE

MOREDUN INSTITUTE, GILMERTON, EDINBURGH

INTRODUCTION

It has been shown that vaccination before service increases the resistance of ewes to the inoculation of virus during pregnancy (McEwen, Stamp & Littlejohn, 1951). Moreover, when experimentally infected ewes were vaccinated before service the incidence of uterine infection at pregnancy was reduced (McEwen, Littlejohn & Foggie, 1951). These findings were substantiated by the satisfactory results given by an extensive field vaccination trial (Littlejohn, Foggie & McEwen, 1952).

The vaccines hitherto used were formalinised suspensions of infected ovine foetal membranes or formalinised suspensions of infected yolk sacs from fertile hens' eggs, and each immunising dose contained a relatively large amount of infected tissue. It was desirable to produce a no less effective but more economical vaccine for field use. The experiments now reported are concerned with this problem.

PRELIMINARY TESTS

Vaccines were prepared from infected ovine foetal membranes, and from infected yolk sacs. Groups of sheep cast from experiments on an unrelated disease were injected each with a different vaccine, and after an appropriate interval the animals were bled and an estimate of their immunity obtained from the serum antibody titre to the complement fixation test. The following vaccines were tested.

Vaccines Prepared from Infected Ovine Foetal Membranes

1. Formalinised saline suspension. Two subcutaneous injections of 5 c.c.

2. Formalinised saline suspension precipitated with potassium alum, the precipitate washed three times in saline and finally suspended to volume in formol saline. Two subcutaneous injections of 5 c.c.

3. Concentrated formalinised suspension emulsified in Falba* and liquid paraffin leve B.P. One subcutaneous injection of 2 c.c.

4. As 3, but emulsified in wool alcohol and Cosmojell 80† and liquid paraffin leve B.P.

5. As 3, but the liquid paraffin leve B.P. was replaced by Marcol.‡

6. As 4, but the liquid paraffin leve B.P. was replaced by Marcol.

* Falba is the trade name for a preparation made by Messrs. Pfaltz & Baur, Inc., New York, U.S.A.

† Cosmojell 80 is manufactured by Messrs. Aston, Brissellier & Laurence, 9 Savoy, Strand, London, W.C.2.

‡ Marcol is a mineral oil supplied by Stemco, Ltd., 128–132 Albert Street, Camden Town, London, N.W.1.

Vaccines Prepared from Infected Yolk Sacs

7. Similar to vaccine 3.
8. Similar to vaccine 4.
9. Similar to vaccine 5.
10. Similar to vaccine 6.

Individual sera from the sheep injected with vaccines prepared from infected ovine foetal membranes were tested with an antigen made from infected yolk sacs, and the sera from sheep given the yolk sac vaccines were tested with antigen prepared from infected foetal membranes. No complement fixing antibody was found in the sera from the sheep that received vaccine 1, but antibody was found in the sera of the sheep that received vaccines 2, 3, 4, 5 and 6. The highest titres were given by the animals that received vaccines 3 and 5. The sera from the sheep injected with vaccines prepared from infected yolk sacs reacted at a lower titre than did the sera from the animals injected with the corresponding vaccines prepared from infected foetal membranes.

The results suggested : (*a*) The probability that vaccines prepared from ovine foetal membranes stimulated a higher degree of immunity in sheep than did vaccines prepared from infected yolk sacs. (*b*) That precipitation of the material by potassium alum improved its immunising property. (*c*) That the emulsification of the material in mineral oil improved its immunising property. (*d*) That Falba was a better emulsifying agent than Cosmojell and wool alcohol.

Accordingly a vaccine was prepared consisting of precipitated foetal membrane tissues emulsified in Falba and liquid paraffin leve B.P. The sera from a group of sheep injected with this vaccine gave higher titres to the complement fixation test than had the sera from the other vaccinated groups.

As the sheep used in the pilot experiments could not be kept for further examinations, it was arranged to repeat some of the experiments ; to test the sera of vaccinated animals for complement fixing antibody and also for virus neutralising antibody, and to examine the sera over a more prolonged period after vaccination.

The complement fixation test demonstrates antibody to a group antigen common to the viruses of the psittacosis lymphogranuloma group, to which group the virus of ewe abortion belongs. It does not necessarily follow that this antibody in the sera of vaccinated sheep is a reliable indication of their resistance to infection with the virus of ewe abortion. It is probable that neutralising antibody provides a guide to the vaccinated animals' resistance to infection.

METHODS

The vaccines used were all prepared from a common pool of formalinised infected foetal membrane tissue.

Vaccine A.—A 10 per cent. suspension of infected foetal membranes in formol saline.

Vaccine B.—A 10 per cent. suspension of infected foetal membranes in formol saline was precipitated by the addition of an equal volume of saline containing potassium alum to give a final concentration of 0·7 per cent. potassium alum. The precipitate was allowed to settle out, the supernatant

syphoned off and the precipitate made up to volume with 0·2 per cent. formol saline. The washing of the precipitate was repeated three times. 0·2 per cent. formol saline was added to the washed precipitate to bring the volume of the suspension of precipitate to that of the suspension of infected foetal membranes from which the precipitate was made. This 10 per cent. suspension of precipitate constituted vaccine B.

Vaccine C.—The thrice washed precipitate, similar to that from which vaccine B was made, was frozen and thawed, and on thawing a clear fluid was expressed ; sufficient of this fluid was syphoned off to leave a 50 per cent. suspension of the precipitate. One part of the 50 per cent. precipitate was emulsified in four parts of oil and constituted vaccine C. The oil was composed of one part of Falba and four parts of liquid paraffin leve B.P. 0·3 per cent. phenol was added to the oil as a preservative and the phenolised oil was sterilised by autoclaving before use. A preliminary emulsification was made in an "Automix," the emulsion was then pumped through a homogeniser.*

The Complement Fixation Test.—The antigen was prepared from infected yolk sacs. Details of the test have been given elsewhere (Foggie, 1954).

The Serum Virus Neutralisation Test.—Mice inoculated intranasally with suspensions of the virus of enzootic abortion develop pneumonia, and at death or slaughter a few days later areas of consolidated lung are found. The response of mice to the inoculation of the same suspension of virus is irregular ; some may die with extensive consolidation of the lungs, while survivors killed up to 12 days after inoculation (the longest period of time tested) may show varying degrees of lung consolidation or even normal lungs. When, however, a sufficient number of mice are used and comparative tests of the neutralisation of the virus by two or more sera are made, it is possible to differentiate between an immune and non-immune serum and to determine whether one immune serum effects a greater neutralisation of the virus than does another.

The virus used in the serum virus neutralisation tests was a 10 per cent. suspension of infected yolk sacs distributed in 2 c.c. quantities in glass containers and kept at –70° C. until used. After thawing the suspension was reground in a Griffith tube before further dilution with infusion broth. Equal volumes of diluted virus and the serum under test were slowly rotated for one hour at 37° C. and 0·05 c.c. quantities of the mixture inoculated intranasally into 20 to 25 gramme mice under light chloroform-ether anaesthesia. At each test two or more sera were compared. Where necessary tests were repeated and the combined results reported, but in no instance have the results given by a serum been used for comparison with the results given by the same or another serum in a different series of tests. At each test not less than 20 mice were inoculated with each serum virus mixture. To equalise the time interval during which the serum and virus were in contact before inoculation, the mixtures in turn were inoculated into groups of five mice, and the procedure repeated until the inoculations were completed. Survivors were killed on the eighth day following inoculation. Mice that died with extensive consolidation of the lungs were given a score of eight. Mice killed on the eighth day were given a score according to the degree of lung consolidation found. The consolidation of the right and left lungs was assessed separately. Macroscopically complete consolidation scored four, a small area of consolidation one, scores of two or three were given to intermediate degrees of consolidation as appropriate. The total possible score for any one mouse was eight. Areas of congestion were disregarded. All the inoculations and the assessments were made by the same person, and the assessments were completed while in ignorance of the particular serum virus mixture any group of mice had received.

Table I shows the vaccinated groups of sheep, the vaccines they received, the number of injections given, the amount of each injection, and the interval between injections. The vaccines were injected subcutaneously. A group was left unvaccinated as controls.

The sheep were bled before and at intervals after vaccination. Before vaccination none of the sera showed complement fixing antibody but a few sera were anticomplementary in low dilution.

Table I

The Groups of Vaccinated and Control Sheep

	Vaccine A			Vaccine B			Vaccine C				
	Dose per injection 5 c.c. subcutaneously			Dose per injection 5 c.c. subcutaneously			Dose per injection 1 c.c. subcut.		Dose per injection 2 c.c. subcut.		Controls non-vaccinated
	Group 1 (9 sheep)	Group 2 (9 sheep)	Group 3 (9 sheep)	Group 4 (10 sheep)	Group 5 (11 sheep)	Group 6 (9 sheep)	Group 7 (7 sheep)	Group 8 (7 sheep)	Group 9 (7 sheep)	Group 10 (7 sheep)	Group 11 (17 sheep)
No. of injections and interval between injections	2	3	4	2	3	4	1	2	1	2	
	14 days	14 days	14 days	14 days	14 days	14 days		28 days		28 days	

Equal quantities of serum from individual sheep in each vaccinated group were pooled after every bleeding. The pools were filtered through Ford G.S. filter pads and stored at –20° C. As opportunity offered they were used for serum virus neutralisation tests. Serum from a sheep whose serum had been anticomplementary at the prevaccination test was excluded from the pools.

Results

Complement Fixation Tests

The mean titres of the sera to the complement fixation test are shown graphically in Fig. 1 (*opposite*).

The sheep given vaccine A (Groups 1, 2 and 3) with few exceptions did not react, but 56 days after the first injection of vaccine the sera from one sheep in Group 1, and two sheep in Group 2 had titres of 1 : 320. As is shown in Fig. 1, the mean titres of the groups of sheep vaccinated with vaccine B (4, 5 and 6) and vaccine C (7, 8, 9 and 10) reached their maxima on this date. A statistical comparison of the mean titres of sera taken one month later (on the 86th day of the experiment) showed that there was no significant difference between the mean titres of the control group and the vaccine

* A "Q.P." homogeniser made by the Ormerod Engineering Co., Rochdale, Lancs.

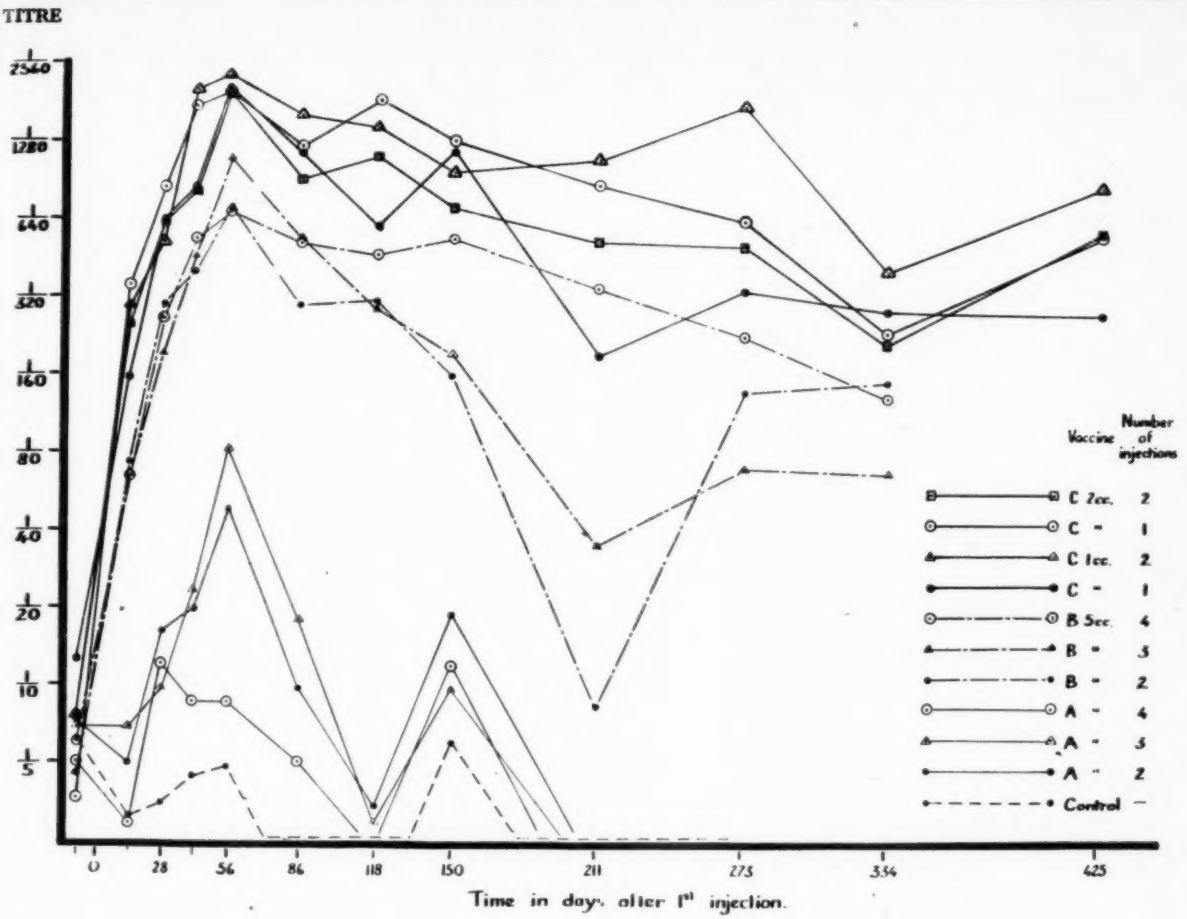

FIG. 1.

A groups (t = 1·690 P = 0·1) ; there was a highly significant difference between the mean titres of the vaccine A groups and the vaccine B groups (t = 4·17 P = <0·001) and a significant difference between the mean titres of the vaccine B groups and the vaccine C groups (t = 2·832 P = 0·01 to 0·001). None of the differences in mean titres of sheep which had received different numbers of doses of the same vaccine were significant on that date.

A large proportion of the sera taken on the 150th day of the experiment (May 23rd, 1953) were anticomplementary in the lower dilutions. This reaction accounts for the apparent rise in titre of the control group and the vaccine A groups on this date. The anticomplementary reaction had no effect on the sera which fixed complement at high dilutions.

Two hundred and eleven days after vaccination all the sera from sheep that received vaccine A were negative. These three groups of vaccinated animals were then dismissed from experiment.

The sera from sheep given vaccine B (Groups 4, 5 and 6) gave good positive reactions at the 56th, 86th and 118th day after vaccination. Sera collected at subsequent bleedings showed a decline in titre and by the 334th day, when the examinations on these animals stopped, a number of sera in all three groups were negative.

All the sheep given vaccine C had sera of comparatively high titre. Four hundred and twenty-five days after vaccination the titres though well maintained were declining, but none of the sera was negative.

None of the control sheep which ran with the vaccinated animals developed complement fixing antibodies.

Neutralisation Tests

At tests, not shown on Table II, where serum from sheep in Group 1 (vaccine A) was compared with normal sheep serum, no evidence of neutralisation of virus by the former was found. In Table II the results of similar tests, tests 5, 7 and 8, are shown and again there is no neutralisation of the virus by serum from sheep in Group 1. So long as sera from sheep in Group 1 were available they were used for comparison with the sera from other vaccinated groups. Later, when the sheep in Group 1 were no longer in experiment, the sera from vaccinated groups were compared with pooled normal sera.

At each test, as an arbitrary standard for the presence of virus neutralising antibody in serum from a vaccinated group, the mean pneumonia score of the mice inoculated with a serum virus mixture had to be one-half or less than that of the mean pneumonia score given by the mice receiving the Group 1 serum virus mixture, or, where Group 1 serum was not used, of the mean pneumonia score given by the mice inoculated with normal serum and virus.

Accepting the above standard it will be seen that none of the sera from vaccinated groups collected 56 days after the

TABLE II

SERUM VIRUS NEUTRALISATION TESTS SHOWING THE MEAN PNEUMONIA SCORE FOR GROUPS OF MICE INOCULATED INTRANASALLY WITH SERUM VIRUS MIXTURES. MAXIMUM POSSIBLE SCORE 8

No. of Test	No. of days after 1st injection of vaccine when bled	Dilution of virus in inoculum	No. of mice used to test each serum	Normal Sheep Serum	Sera from Vaccinated Sheep									
					Vaccine A			Vaccine B			Vaccine C			
					Group 1 2 injections of 5 c.c.	Group 2 3 injections of 5 c.c.	Group 3 4 injections of 5 c.c.	Group 4 2 injections of 5 c.c.	Group 5 3 injections of 5 c.c.	Group 6 4 injections of 5 c.c.	Group 7 1 injection of 1 c.c.	Group 8 2 injections of 1 c.c.	Group 9 1 injection of 2 c.c.	Group 10 2 injections of 2 c.c.
				Mean score	Mean score	Mean score	Mean score	Mean score	Mean score	Mean score	Mean score	Mean score	Mean score	Mean score
1	56	1:80	35		6·2 (1:5)	6·5 (1:80)	3·8 (1:5)	4·8 (1-640)	5·6 (1:640)	4·2 (1:1280)				
2	56	1:80	40		5·9						6·9 (1:1280)	3·7 (1:2560)	4·8 (1:1280)	3·0 (1:2560)
3	118	1:80	80		6·1 (neg)						3·8 (1:640)	**1·7** (1:2560)	**1·0** (1:2560)	**1·4** (1:1280)
4	118	1:80	80		4·6	4·0	5·3	5·0	3·4	**1·4**				
5	118	1:320	20	3·6	4·2						2·7			
6	118	1:320	20		2·9							**0·7**	**0·0**	
7	150	1:320	120	4·2	5·3 (neg)						**1·5** (1:640)			
8	150	1:1280	120	3·3	2·6						**0·4**			
9	273	1:320	80	5·6							**2·7** (1:320)	**3·0** (1:5120)	**2·1** (1:1280)	**1·9** (1:640)
10	334	1:320	60	6·2				5·4 (1:160)	4·9 (1:40)	**0·6** (1:640)	**0·2** (1:320)			
11	334	1:320	80								**0·2**	**1·0** (1:1280)	**1·2** (1:640)	**1·9** (1:640)
12	425	1:320	20	5·4							**0·2** (1:320)	**0·8** (1:1280)	**0·8** (1:640)	**1·0** (1:320)
13	425	1:320	20								0·0	0·2	0·3	0·1

When the serum virus neutralisation tests were completed the pools of sera from the vaccinated groups were all tested for complement fixation : the serum titres obtained at these tests are shown enclosed in brackets.

The first eight serum neutralisation tests were made with samples from the same pool of virus. The remainder of the tests were made with samples from another pool.

Heavy type indicates groups of mice where the score was half or less than half of that given by mice inoculated with mixtures of virus and serum from sheep in Group 1 or with virus and normal serum.

first injection of vaccine had a significant antibody content. In the sera collected at the 118th day virus neutralising antibody was demonstrated in serum from Group 6 (vaccine B) and in sera from Groups 8, 9 and 10 (vaccine C). Serum from Group 7 (vaccine C) collected 150 days after vaccination contained virus neutralising antibody. Sera were collected at 334 days from Groups 4 to 10 inclusive ; the sera from Groups 4 and 5 (vaccine B) showed no virus neutralising antibody, but the remaining sera, Group 6 (vaccine B) and Groups 7 to 10 inclusive (vaccine C), neutralised the virus. Furthermore, 425 days after the first injection of vaccine the sera from Groups 7 to 10 were found to contain virus neutralising antibody and in so far as was demonstrable by the method used the sera were comparable.

The delayed appearance of appreciable virus neutralising antibody in the pooled serum of sheep in Group 7 compared with the earlier detection of antibody in the sera of sheep in Groups 8, 9 and 10 that received great quantities of vaccine C, suggests that the larger dose of vaccine stimulated an earlier but not eventually a greater immunity response.

In the field it is the practice to vaccinate sheep in the late summer or autumn before service, and exposure to infection does not occur until four to seven months later when infected ewes abort or lamb. A delayed immunity response is therefore of no disadvantage where the disease is controlled by vaccination.

The pooled sera used in the serum virus neutralisation tests were all examined at one and the same time by the complement fixation test, permitting of as close a comparison as possible of the titres of the sera. Those titres are shown enclosed in brackets in Table II.

The titres given by the sera collected 56 days after vaccination from sheep in Groups 4 to 10 inclusive were all high, but virus neutralising antibody was never demonstrated in sera from Groups 4 and 5, and at this time the sera from the remaining groups showed less neutralisation of virus than they did when the sera were collected at longer intervals after vaccination. At later intervals the titres to the complement fixation test showed a tendency to decline but so long as Groups 6 to 10 were in experiment virus neutralising antibody

was demonstrated in their sera. The complement fixation antibody titre of the sera from vaccinated sheep is therefore not necessarily a guide to the presence or absence of virus neutralising antibody demonstrable by the method used, although in these experiments the two antibodies were generally present in the same serum.

Discussion

Many different adjuvants have been found to enhance antigenicity and of these alum has been widely used to improve the antigenicity of bacterial toxoids and bacterial vaccines. Topping and Bengtson (1945) precipitated typhus vaccine prepared from infected egg yolk sacs with alum, resuspended the washed precipitate in saline and found that alum precipitation improved the antigenicity of the vaccine.

Freund & McDermott (1942) reported that the antigenicity of horse serum was enhanced by the emulsification of the serum, together with killed tubercle bacilli, in mineral oil. Since then the immunity response to many antigens including killed bacteria and viruses, bacterial toxoids, pollen extracts, serum globulin, egg albumin and C.N.S. tissue has been enhanced and prolonged by emulsification of the antigen in mineral oil, either with or without the addition of killed acid-fast bacilli. Replacement of the mineral oil by a vegetable oil has not been found satisfactory, but a number of different emulsifying agents have been successfully employed and of these Falba has been most widely used.

The preliminary experiments now reported indicated that the antigenicity of the ewe abortion virus in infected ovine foetal membrane tissue was enhanced by precipitation of the virus loaded tissues with potassium alum, and it was found that the antigenicity of both the non-precipitated and the precipitated material was relatively improved when they were emulsified in mineral oil.

The later series of experiments confirmed these findings and demonstrated that a single injection of a vaccine consisting of the precipitated infected ovine foetal membrane tissues emulsified in oil conferred a higher and more lasting immunity, as determined by the presence of complement fixing antibody and virus neutralising antibody in the sera of vaccinated sheep, than did multiple injections of either the non-precipitated or the precipitated tissues suspended in saline.

The observation that the production of virus neutralising antibody although delayed in the sheep that received the smallest injection of the emulsion vaccine was ultimately similar for all four groups of sheep given this vaccine is compatible with the results obtained by Talmage & Dixon (1954), who, working with egg albumin and bovine γ-globulin emulsified in mineral oil, found an initial rapid loss of antigen followed by a prolonged loss, but the serum antibodies remained at a high titre when little or no antigen remained in the body, suggesting that following the injection of the antigen emulsified in oil the ultimate concentration of the antigen was not a limiting factor to antibody production. The very small amount of foetal membrane material in an immunising dose of the emulsion vaccine is economically important in the preparation of large quantities of vaccine for field use, reducing the number of ewes to be kept through pregnancy and slaughtered before abortion or lambing to provide the virus infected tissues for the vaccine.

Vaccines consisting of bacteria, their products, or of viruses in water-in-oil emulsions, probably because of the local reactions that may occur at the site of injection, have been used but little in human practice. In veterinary practice so long as the local reaction is not pronounced there should not be the same objection to their use, and there is scope for their wider application than heretofore. Suspensions of killed Johne bacilli in mineral oil have been used for the vaccination of sheep in Iceland and are an instance of the field application of an oil adjuvant vaccine although the vaccine was not in emulsion form (Sigurdsson, 1952).

For field use a vaccine should be in a form that can be used without difficulty by the farmer or shepherd. It must be easily drawn into and ejected from a syringe through a moderately fine bore needle. The physical properties of the foetal membrane emulsion vaccine conform to these requirements. Furthermore, vaccine should be injected by the subcutaneous route to which farmers and shepherds are accustomed. As these experiments were made with a view to finding a vaccine suitable for field use all the injections of vaccine were given subcutaneously and no objectionable local reactions occurred.

Conclusions

A single subcutaneous injection of an adjuvant vaccine prepared from infected ovine foetal membrane tissue precipitated by alum and emulsified in mineral oil stimulates the production of complement fixing antibody and virus neutralising antibody in the sera of sheep.

These antibodies persisted for a period of 425 days, the longest period over which tests have been made.

A single subcutaneous injection of the vaccine is suitable for use in the field.

When a " watery " vaccine was used in the field (Littlejohn, Foggie & McEwen, 1952) it was the practice to revaccinate yearly those ewes which were to be kept in the flock for two or more lambing seasons. The evidence submitted suggests that the prolonged immunity following an injection of the adjuvant vaccine may make revaccination at yearly intervals unnecessary. Whether revaccination at longer intervals is desirable may only be ascertained by further work.

Acknowledgments.—We express our thanks to Mr. E. M. Bavin, of Herts Pharmaceuticals, Ltd., Welwyn Garden City, who suggested the use of wool alcohol and Cosmojell 80 as an emulsifying agent and kindly gave us samples of these reagents. We also thank Messrs. Pflautz & Bauer, Inc., New York, for a sample of Falba. In the summer of 1952 it was hoped to use an adjuvant vaccine containing Falba in the field, but delays were occurring in the receipt of the import licence. These were mentioned to Principal T. Lloyd Jones, of the Ontario Veterinary College, Guelph, Canada, when he visited the Institute. He came to our immediate assistance and most generously presented the Institute with a liberal supply of Falba. We are very glad to have the opportunity of expressing our indebtedness and thanks to Principal Lloyd Jones for his most valued aid.

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LIVER BIOPSY IN THE DIAGNOSIS OF RAGWORT (*SENECIO JACOBEA*) POISONING IN A HERD OF CATTLE

BY

R. W. BETTY,

Crewkerne, Somerset,

AND

L. M. MARKSON,

Veterinary Laboratory, Weybridge

For several years now, liver biopsy has been employed as a routine diagnostic technique in human medicine. In veterinary work, however, it has so far been used mainly as a research tool. Isaksson (1951) described a method of liver biopsy for the horse which, he said, " has been carried out for the last 15 years in Sweden. . . ." But this was the only reference to liver biopsy in routine diagnosis found by the authors—and that after the present investigation had been made. This present paper describes an outbreak of disease in a herd of Friesian cattle, in which liver biopsies were used to confirm the diagnosis of ragwort poisoning and to detect it in those animals affected subclinically.

The farm on which the outbreak occurred is heavily infested with the common ragwort (*Senecio jacobea*) especially the hilly pastures which are grazed by the heifers and dry cows. There is less ragwort in the pasture grazed by the milking herd and in these animals losses from ragwort poisoning were fewer. In this outbreak, the ingestion of the weed was probably associated with poor condition of the pasture during an exceptionally dry summer. Attempts had been made, not always successfully, to control the weed by cutting it before it seeded. The cut plants were always left on the ground, however, and might have been eaten in the dried state. None of the stock was fed hay containing ragwort.

Case 1

A seven-year-old cow, dry and seven and a half months pregnant. When first examined, she was sitting in a field full of ragwort with her muzzle pressed firmly against the ground, unable to rise. If her head were forcibly moved, she always returned it to the same position. Her temperature was 95° F. and her respiration rapid, shallow and laboured. Although her pupils were dilated and the corneal reflex strong, her eyes had a glassy, unseeing appearance; she seemed to be completely blind. Persistent tenesmus produced a little, dry, hard, blood-tinged faeces. Vaginal examination revealed no evidence of impending abortion. Acute ragwort poisoning was tentatively diagnosed and slaughter advised.

The most striking feature seen at necropsy was extreme oedema of the small-intestinal mesentery and the mesenteric lymph nodes. The small intestine itself was not oedematous, but its serosal surface bore several petechial haemorrhages. The surface of the liver had a nutmeg appearance. There was no sign of fluke infestation. Portions were taken for microscopical examination.

Histology

Generally, the sections showed that the normal architecture of the liver had been disrupted by fibrosis to an extent which varied from field to field. Everywhere hepatic cells were isolated in clumps or singly, by variable, sometimes considerable, amounts of collagen tissue. Often the clumps were so large as to simulate lobules, but they contained no centrolobular vein and their sinusoids were bounded by more collagen material than normal and were often compressed. The hepatic cells themselves varied widely in size and shape. There was considerable variation too in the size of their nuclei. But it was obvious from the sections that the hepatic cells, however abnormal, had been viable at the time of fixation. Another feature of these sections was marked proliferation of biliary epithelium. The entire microscopic picture suggested extensive liver degeneration in the past, now healed by fibrosis and completely haphazard regeneration. Under the circumstances, this picture strongly supported the clinical diagnosis.

Case 2

Six days later, when the heifers and dry stock were inspected in the evening on their hill grazing, one of them, a four-year-old cow, seven months pregnant, was seen to be vaguely ill without any definite symptoms. Brought in for observation, she was found dead the following morning.

A complete autopsy was not possible, only the liver was available for examination. This was pale and free of flukes. Portions were taken for microscopical examination.

The microscopical picture of this liver closely resembled that found in Case 1.

Case 3

The next day, advice was sought on a three-and-a-half-year-old milking heifer which had been scouring for several days. The animal's general condition was fairly good. Her temperature, pulse, respiration and rumen movements were normal, but her appetite was depressed and her milk yield reduced. Her faeces were dark and very fluid, but not bubbly. The liver was palpable behind the last rib.

Astringents were prescribed and housing on dry fodder advised. Meanwhile a faeces sample was examined for evidence of helminthiasis and Johne's disease. Only fifty worm eggs per gramme were found and no acid-alcohol-fast bacilli. In spite of the continued use of astringents, there was no improvement. The faeces remained very loose and gradually became darker. The animal became emaciated until, unable to rise, she was slaughtered nearly a fortnight later.

At autopsy the liver, although a little pale, was normal in shape and size but firm to cut. The small intestine was inflamed and thickened, suggesting Johne's disease as a possible diagnosis. Portions of liver and ileum were taken for microscopical examination. There was no evidence of Johne's disease in the sections of ileum.

The microscopical picture of this liver closely resembled that found in Case 1.

Case 4

This was similar to Case 3 in that diarrhoea and cachexia were the predominant symptoms. Latterly tenesmus developed, with the passage, after rectal examination, of small blood clots and mucus. In view of the previous cases, ragwort poisoning was suspected. In an attempt to confirm this, it was decided to perform a liver biopsy on this animal, using the technique and the instrument described by Loosmore & Allcroft (1951). The liver core obtained was quite hard and yellow, its gross appearance being sufficient under the circumstances to confirm the diagnosis. The animal was slaughtered.

At autopsy, the mesentery and mesenteric lymph nodes of the small intestine were very oedematous. Even more striking was the extreme oedema of the folds of the abomasal

FIG. 1.—Transverse section of a biopsy sample of normal liver. × 102.

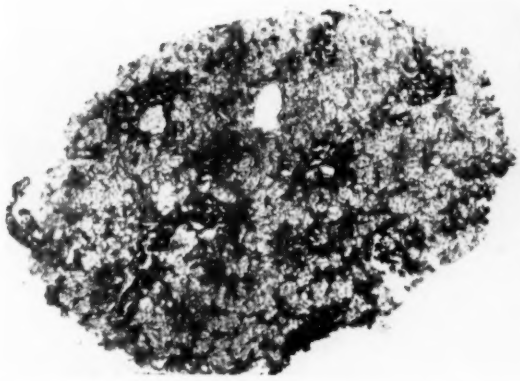

FIG. 2.—Transverse section of a biopsy sample of diseased liver. × 102.

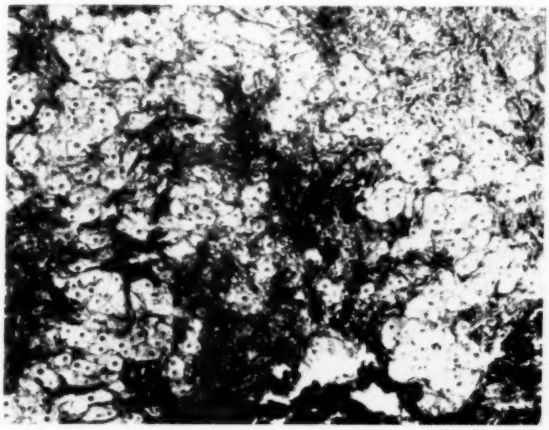

FIG. 3.—The same as 2, more highly magnified. Extensive fibrosis has completely disrupted the normal architecture of the liver. × 216.

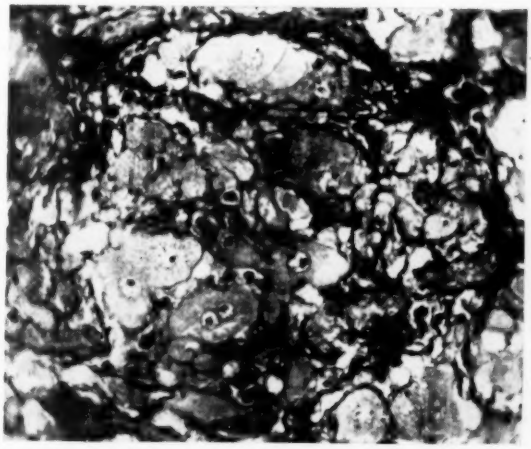

FIG. 4.—This demonstrates in still higher magnification the havoc wrought by the extensive scarring. × 907.

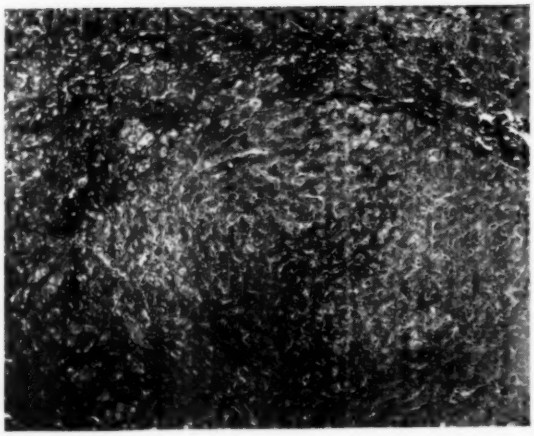

FIG. 5.—Repair by regeneration. A large mass of apparently normal hepatic cells is surrounded by scarred tissues. Normal lobular structure has not been achieved. × 216.

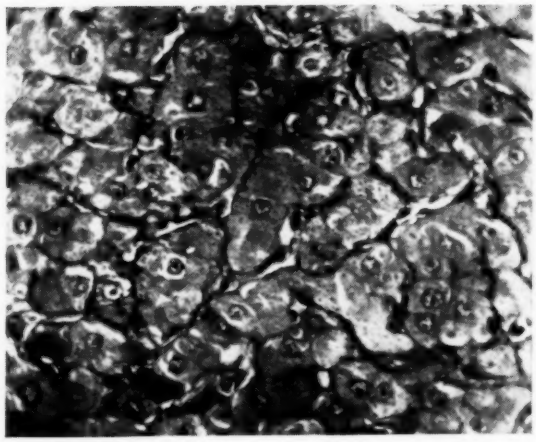

FIG. 6.—The same as 5, more highly magnified. There is considerable variation in the size and shape of the cells and a few collagen fibres have been laid down between them. × 907.

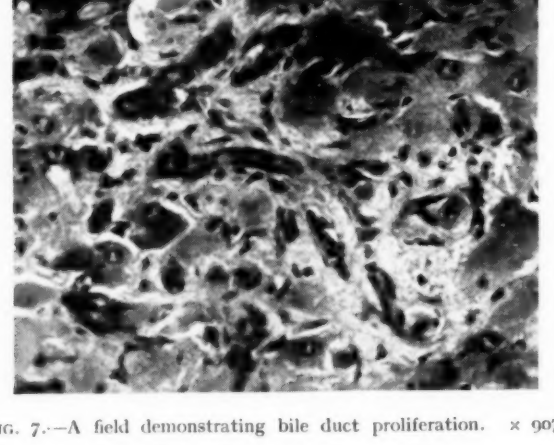

FIG. 7.—A field demonstrating bile duct proliferation. × 907.

Plates 1 to 6 were stained by Masson's trichrome technique and photographed through a red filter on panchromatic plates. Plate 7 was stained by haematoxylin and eosin and photographed through a green filter.

mucosa, all of which were affected, some swollen to a thickness of 1½ inches. This oedema extended between the muscular layers of the abomasal wall and was appreciable, too, under its serous lining. The rest of the alimentary canal was normal.

The liver weighed 23 lb. No flukes were seen, but calcified bile ducts indicated former infestation. The entire liver was yellowish in colour and uniformly fibrotic. The site where the biopsy had been removed was filled with a clot of blood the edge of which was level with the surface of the liver. There was no sign of haemorrhage into the peritoneal cavity, although, when the biopsy was taken the syringe had been three-quarters full of blood. The gall bladder contained 2½ pints of bile. A portion of liver was taken for microscopical comparison with the biopsy.

Histology

The microscopic picture of both biopsy and necropsy samples was the same. All that remained of recognisable liver tissue were small, irregular groups of hepatic cells separated from one another by variable amounts of collagen and from neighbouring groups by thick bands and irregular masses of collagen fibres. In fact, the low power view of sections gave the impression of irregular islands of hepatic cells almost submerged beneath a sea of scar tissue. The cells themselves were as abnormal as those described in Case 1. Numerous bile ductules could be seen groping blindly through the collagen stroma in their attempts to reach and tap the islands of hepatic cells. Most of the sinusoids had been obliterated; a few were moderately congested.

Basically this was the same condition as that encountered in Cases 1 to 3. But in Case 4, fibrosis was much more severe. Far from the cirrhosis being multilobular or perilobular—for there were no lobules left—it was pericellular.

This picture was interpreted as strongly supporting the clinical diagnosis.

At this stage in the investigation, the decision was taken to examine liver biopsy samples from clinically suspicious animals.

Case 5

A seven-year-old milking cow, three months pregnant, whose only symptoms were poor appetite, physical wasting and diarrhoea. No difficulty was experienced in obtaining a liver core. The specimen was pale and tough, which suggested a positive diagnosis, subsequently confirmed by the sections. During the next few days the animal's condition rapidly deteriorated and she was slaughtered. As the authors were not informed of this, an autopsy was impossible.

Case 6

A three-year-old heifer in which profuse diarrhoea with tenesmus was the obvious symptom. The faeces were darker than normal. Closer examination proved her to be completely blind.

Three attempts were made to obtain a liver biopsy, each unsuccessful, although for the third attempt the site of the skin incision was moved 2 inches lower. As this appeared to be an advanced case of ragwort poisoning beyond all hope of recovery, an exploratory laparotomy was performed in order to examine, as well as locate, the liver. Anaesthesia was obtained by local infiltration with 5 per cent. procaine hydrochloride together with regional nerve block. The animal stood throughout the operation with one man holding her by the nose. The incision was 7 inches long, parallel to the last rib and about 1 inch behind it. The three biopsy wounds in the liver were felt quite distinctly, the first two high up near the dorsal surface. The incision was closed. As a result of this examination, it was decided to continue using a site in the 11th intercostal space, but to make the puncture lower—about 9 inches from the dorsal vertebral spines in the average adult Friesian.

The following day the heifer was destroyed and the carcase examined. The most striking feature was extreme gelatinous oedema of the mesocolon, although the large intestine itself was normal. The mucosal folds of the abomasum were oedematous. Apart from the evidence of slight chronic fluke infestation, the liver was diffusely, but irregularly, fibrotic.

Microscopical examination supported the clinical diagnosis.

The method used to obtain these liver biopsies appeared to be most uncertain. There was no difficulty in getting the canula into the liver, but the application of quite strong negative pressure with the syringe did not seem to be the ideal method of removing a core firmly attached at its base to a fibrosed liver. After repeated trials with the fresh liver of Case 6, the technique was modified. The canula was pushed into the liver to cut a core, was then withdrawn about ½-inch and pushed in again, deeper this time and at a different angle. This time the base of the core was severed completely and the sample easily removed.

The method was now applied to the living animal. The canula was inserted in the usual way, rotated into the liver, then withdrawn a little. When the liver moved backward in inspiration, the tip of the canula moved back with it and was held in that position as the liver moved forward in expiration. At this moment it was rotated again, so that it severed the base of the core. The core was now removed quite easily with light negative pressure. With practice this technique gave excellent results. If stronger pressure was applied and the pin inserted to hold the piston, the core was pushed right into the syringe.

We now resolved to take biopsies from the entire herd, beginning with the 26 milking cows. The animals were anaesthetised in groups of five and operated on in the order of injection. The instruments were sterilised by boiling to begin with, washed with clean water after each individual operation and immersed in 1 per cent. cetavlon in 70 per cent. alcohol until needed for the next operation. Finally, all the skin wounds were wiped clean and dressed with intramammary penicillin in cerate. With one assistant to nose the cows, the entire series took only 3¼ hours. Twenty-five of the operations were successful. In the remaining one the liver could not be found. The wounds all healed without any further attention. The total milk yield that afternoon was down by ·5 gal. The next morning it was normal. The drop may well have been due to loss of feeding and the usual routine being disorganised.

All the samples were microscopically normal.

A week later, successful biopsy operations were performed on 19 apparently healthy animals—one bull, five dry cows, and 13 bulling or pregnant heifers. The time taken was 2½ hours. Two of the biopsy samples removed were noticeably pale, yellowish and fibrotic. Furthermore, in excising one of them, considerable pressure had to be applied in pushing and rotating the canula into the liver. Both these animals were tentatively diagnosed as positive cases. Microscopical examination supported this diagnosis and confirmed that the other 15 samples were normal. One of the two diseased heifers became a clinical case before it was slaughtered. The carcases were not available for autopsy.

To complete the story, biopsy samples were removed from eight yearling heifers which had just returned from keep but which had had ample opportunity of eating ragwort. The entire operation lasted only 50 minutes. All the liver cores were grossly and microscopically normal. Thus, with the exception of two cows, in one of which the liver could not be felt, and the young calves, which had never been out of doors, the entire herd had now been successfully subjected to liver biopsy.

Discussion

The principal reasons for publishing this paper are to draw attention to the fact that the examination of liver biopsies can be a valuable aid to clinical diagnosis, and to demonstrate that the technique of obtaining the biopsies is one which can be performed easily and with reasonable speed under typical conditions of general practice.

After three cases of ragwort poisoning had been diagnosed in a herd, liver biopsy was attempted on 56 animals, failing in only two. One of these was diagnosed clinically and confirmed at necropsy. The other remained healthy. Of the 54 successful biopsy samples, four were fibrotic. Two of these came from clinically diseased animals. A third came from a subclinical case which developed typical symptoms and was slaughtered, the disease being confirmed at necropsy. As for the fourth, when the owner heard that the biopsy was positive, he had the animal slaughtered, unknown to the authors who were thus denied access to the carcase. These numbers are small, but they are not insignificant.

The literature on *Senecio* poisoning is considerable. Reports by Gilruth and by Chase which date from 1903 and 1904 respectively described a clinical and morbid picture comparable to the foregoing account. Both men reproduced the disease by feeding the appropriate species of *Senecio* to their experimental animals. Later workers tried to reconstruct the development of the hepatic lesions from the final picture. Craig, Kearney & Timoney (1930) were the first to employ the phrase " pericellular cirrhosis," a term since repeated by Gaiger & Davies (1946) and one which has gained some currency as being typical of ragwort poisoning. The hepatic lesions are essentially those of a chronic hepatitis of portal origin, *i.e.*, caused by toxic substances absorbed from the intestine. It may be argued that this is not a specific lesion. On the other hand, we know of no other poison which causes the same lesion in cattle.

In the outbreak of disease described in this paper, the circumstances on the farm, the clinical syndrome and the morbid anatomy suggested ragwort poisoning as the only reasonable diagnosis. The presence of toxic fibrosis in the liver confirmed this opinion. It seemed reasonable, therefore, to interpret as evidence of subclinical ragwort poisoning, the presence of a comparable lesion in liver biopsies from the apparently healthy stock.

Repair and regeneration are relative terms. Even when the damaged tissues are replaced by new hepatic cells, normal liver architecture and normal liver function are not achieved, while scarring, although in itself a physiological response to tissue destruction, is the negation of normal glandular function. In this sense the liver damage is irreversible once it has passed a certain stage, and consequently there is no cure for the disease whether it is clinical or subclinical but demonstrable. But a technique which picks out the subclinically diseased animal has its value. It enables the animal to be converted into meat, before the disease has converted it into a casualty, fit only for the knacker. Nevertheless, laboratory examination of a liver biopsy is no substitute for a careful clinical examination and a balanced assessment of all the evidence; it is, however, a very useful adjunct.

Summary

This paper describes an outbreak of disease in a herd of cattle. Consideration of the farm, the clinical syndrome and the morbid anatomy of those animals which had died led to the diagnosis of ragwort poisoning. The discovery of toxic fibrosis in sections of liver from these animals confirmed this. Liver biopsies were performed on most of the remaining animals in the herd. The presence of comparable fibrosis in sections of some biopsies was interpreted as evidence of the same disease. Liver biopsy is a convenient and practicable technique under conditions of general veterinary practice. Microscopic examination of samples of liver thus obtained is a useful adjunct to clinical examination.

Acknowledgments.—The authors wish to convey their thanks to Mr. W. B. Martin, M.R.C.V.S., who saw and described the first case, to Professor M. Skeene, of Bristol University, who specifically identified the plants, and to Mr. D. W. Menzies, M.R.C.V.S., Superintendent Veterinary Investigation Officer of the Ministry of Agriculture and Fisheries, who put the authors in touch with one another.

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REPORT ON MEAT INSPECTION AND CONTROL IN WESTERN EUROPE

Members of the Association will see enclosed with their copies of this week's " Record " a booklet with the above title, containing the Report of the Association's Special Committee which visited various Western European countries during the last Parliamentary recess. The Report and its appendices cannot fail to be of the greatest importance and interest, especially in view of the de-rationing of meat and the increase in the number of slaughtering establishments.

Copies of the booklet have been sent to all Members of Parliament and will, after the Profession has received them, be sent also to various other interested persons and public bodies. A Press conference has been arranged for next Tuesday, July 13th, when the Committee's findings and views will be made known to the newspapers. All the members of the Committee will be present to answer questions.

In our next issue we shall review the booklet in detail in a leading article; but it may be observed, in the meantime, that Dr. Wooldridge, Mr. Thornton, and their Parliamentary colleague, one invited from each of the two principal Parties, have performed a most valuable public service.

CLINICAL COMMUNICATION

A 371-DAY GESTATION PERIOD IN A DAIRY SHORTHORN HEIFER

ERIC I. WILLIAMS,
St. Clears, Carmarthen

Subject.—Three-year-old white dairy Shorthorn heifer, "Meadowland Carnation 13th"; born 3.10.50.

History.—This heifer was mated to a pedigree Shorthorn bull on Boxing Day, 1952, and was provisionally entered for the B.D.F.A.'s Annual Show in London the following October. One thousand I.U. "Lutormone" (Burroughs Wellcome) were given intramuscularly on the same day as service, because of recurrent oestrus in the previous few months.

Examination.—Since there were no signs of impending parturition early in October, 1953, professional advice was sought. Examination of the animal revealed little sign of udder development although an apparently full-term foetus could be palpated by rectal examination. Further visits were made in mid-November and on December 15th. There was some evidence of udder development on the latter occasion, whilst it was definitely established that the foetus was still alive on December 27th.

Early on New Year's morning (1954), the animal started to calve. The presentation was normal, but an attempt at normal delivery was soon abandoned because of the large bony framework of the foetus. A caesarean operation was performed on the left side, 2 inches anterior to, and parallel with, the fold of the flank. A dead roan heifer calf weighing 106 lb. was delivered.

Subsequent History.—The heifer made an excellent recovery, giving 27 lb. of milk (2X) on January 5th/6th increasing steadily to 46 lb. daily by February 17th, and was still giving 40 lb. daily on 25.5.54. The first oestrus period occurred on 10.3.54 and the animal was inseminated at the next oestrus on 31.3.54. This had to be repeated on 21.4.54 but without success, oestrus occurring again on 12.5.54. Uterine irrigation was then carried out.

Discussion

This case is recorded on account of the unusually long gestation period during which the foetus was alive up to three days before parturition. Reference to the available literature revealed a 439-day period quoted by a German journal from an Italian source (1936). A 404-day period was reported in a Czechoslovakian paper (1941) whilst a Dutch paper (1937) stated that a male calf, showing various abnormalities, died two days before parturition after a 390-day period and weighed 35 kg.

"Forceps" (1954) referred to 353 days as being the longest gestation period recorded in the cow (presumably in this country).

Acknowledgment.—The writer is indebted to J. P. Maule, Esq., M.A. (Cantab.), Dip. Agr., A.I.C.T.A.; Director of the Commonwealth Bureau of Animal Breeding and Genetics, Edinburgh, for reference to the literature.

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ABSTRACTS

Parturient Paresis*

Urine samples from cows suffering from "milk-fever" (parturient paresis) were examined biochemically for neutral steroids and corticoids. In order to provide comparative figures similar analyses were made on urine from normal cows in the last month of gestation, immediately after calving, and 4 to 8 weeks after calving.

The results of these analyses showed :

Group of cows	Corticoids (mg./litre)	Neutral steroid mg./litre
1. Last month of pregnancy ...	...8·2 (6·1—13·5)	45 (35—51)
2. 48 hours after parturition ...	...5·1 (3·5—6·3)	36 (30—47)
3. 48–120 hours after parturition	...4·4 (3·1—5·9)	30 (19—43)
4. 4–8 weeks after parturition	...4·0 (2·5—4·9)	19 (17—23)
5. Milk fever cases, 48 hours *post-partum*	...1·4 (0·3—2·1)	14 (8—18)

The author interprets these results as indicating that pregnancy can be regarded as a low-grade, gradually increasing stress. After parturition when the stress is alleviated the urinary corticoids and neutral steroid level falls and is followed by a gradual subsidence following a return to the normal level of function in the adrenal cortex.

The low level of urinary corticoid and neutral steroid seen in the cases of milk fever indicates a low level of activity of the adrenal cortex in this disease. This suggests exhaustion of the adrenal cortex which may possibly occur even before obvious symptoms of parturient paresis appear. The cause of the condition is probably the stress of heavy lactation which is apparently linked with other predisposing factors (*e.g.*, a hereditary weakness of the endocrine system).

Treatment of milk-fever by air insufflation of the udder probably acts by reducing milk secretion and so avoiding complete non-reversible exhaustion of adrenal cortex hormones. Calcium therapy is not a simple substitutional therapy but may act as a stimulant to the regulatory mechanism of calcium metabolism. The author suggests that ACTH and corticoids would be rational therapy if used early in milk-fever.

F. R. B.

* **Excretion of Reducing Corticoids and Neutral Steroids in the Urine of Cows with Parturient Paresis.** Holcombe, R. B. (1953). *Brit. vet. J.* **109.** 359–364.

* * * * *

Magnesium Deficiency in Calves

Part I*

Clinical and pathological observations were made on calves in which magnesium deficiency was produced experimentally by feeding a diet deficient in magnesium. Two calves died in convulsions, one was killed in convulsions and a fourth, which developed tetany, was treated with magnesium sulphate intravenously and was subsequently slaughtered after 109 days of treatment. The two calves that died received a diet, the magnesium content in one case being 0·5 mg. per 100 ml. and in the other case 1·6 mg. per 100 ml. throughout the experimental period. The calf that was killed in convulsions and the one that was treated both received a diet with a magnesium content of 0·5 mg. per 100 ml. Three calves which received diets containing 12·5 mg., 19·0 mg. and 5·8 mg. per 100 ml. magnesium respectively, later reduced to 4·1 mg. per 100 ml., appeared perfectly normal throughout.

* **Experimental Magnesium Deficiency in Calves. 1. Clinical and Pathological Observations.** Blaxter, K. L., Rook, J. A. F., & MacDonald, A. M. (1954). *J. comp. Path.* **64.** 157–175.

The first signs noticed were changes in the carriage of the head and ears. Tetany was not observed until the blood magnesium content fell below 0·7 mg. per 100 ml. The tetany gave way to convulsions.

It is contended that, to maintain a normal serum value of 2·1 mg. magnesium per 100 ml., a dietary concentration of 14 mg. per 100 ml. was necessary. The signs of uncomplicated magnesium deficiency developed in experimental calves, aged 50 to 120 days. There was no detectable loss of magnesium from the soft tissues but the magnesium content of bone was depleted to the extent of 30 per cent.

The outstanding *post-mortem* observation in the clinically affected calves was the presence of haemorrhagic areas coupled with acute congestion of the internal organs.

PART II †

This paper deals with the same seven experimental animals described in the first paper abstracted above. Continuous metabolic studies were made with calves given rations containing different proportions of magnesium. It is reported that the cumulative retention of magnesium could be predicted from the data obtained simultaneously as to calcium and nitrogen retention. The evidence from these calves points to magnesium deficiency having no effect on either calcium metabolism or nitrogen metabolism.

From these observations, it is calculated by the authors that, in calves gaining 1 lb. per day in weight, a dietary concentration of 16 to 18 mg. magnesium per 100 ml. is required to ensure 90 per cent. saturation of the animal's capabilities to retain magnesium from a standard quantity of diet. The maintenance requirement for magnesium could be met by a dietary concentration of approximately 8 mg. per 100 ml.

It is considered that the calf must be depleted of 30 per cent. of its total body magnesium to cause tetanic convulsions.

G. F. B.

† **Experimental Magnesium Deficiency in Calves. 2. The Metabolism of Calcium, Magnesium and Nitrogen and Magnesium Requirements.** BLAXTER, K. L., & ROOK, J. A. F. (1954). *J. comp. Path.* **64.** 176–186.

REVIEW

[Essentials of Histology. SCHAFER. 16th Edn. Edited by H. M. CARLETON & R. H. D. SHORT. Longmans Green & Co., 35s.]

It must be a matter of satisfaction to the publishers and to readers alike that this is the 16th edition of a standard work on histology: over 130,000 copies have been printed since it was first published in 1885, and it is still a fitting memorial to its first author, Sir E. Sharpey-Schafer, who edited the book for nearly 50 years. The reviewer used "Schafer" in his veterinary course nearly 20 years ago, and despite the publication of a number of other, newer works, he still maintains his old affection for it—as no doubt do generations of veterinary students—and he would bring it warmly to the notice of students of the present day. Its chief qualities lie in its handy size, its cheapness, its numerous illustrations, its clearly written textual matter, its attention to physiological aspects of the subject, and its general "good looks" as a book. A welcome innovation in this edition is that the practical class instructions have been brought together from the heads of the chapters to an appendix. Some references are made to the histology of domestic animals, but the book is of course primarily a text-book for medical students; however, the veterinary student will find that it serves as a very valuable basis on which to build his more specialised studies.

There is, however, one serious criticism to be made, and that is in regard to the absence, except in a few instances, of references. Numerous people are named in the text, and are duly indexed, but the all-important references to their original papers are omitted: this is really inexcusable nowadays. A less serious criticism is that just a few of the illustrations are of only mediocre quality. The "historical note" at the beginning of the book is somewhat thin. One would like also to see some electron microscope pictures, *e.g.*, of collagen fibres.

We may confidently suppose that this edition will be one of a long series, and with judicious pruning, and a constant attention to important recent advances, the book will continue to be one of the student's favourite histology text-books.

INTERNATIONAL HIDE AND ALLIED TRADES IMPROVEMENT SOCIETY

As already briefly reported in our columns, the 1954 annual congress of I.H.A.T.I.S. was held at the North British Hotel, Edinburgh, from June 6th to 10th, when delegates from many of the 22 member counties were in attendance. The Scottish Hide Inspection and Improvement Federation, under the chairmanship of Mr. R. G. McQueen, acted as hosts to a most successful conference. British veterinarians present included Professor A. Robertson and Mr. J. A. Campbell (Edinburgh), Mr. A. L. Wilson (Auchincruive), and Mr. A. N. Worden (Huntingdon).

The scientific and technical discussions occupied five sessions, and again the warble fly problem received detailed consideration. The interim results of further dosing trials with anthelmintic preparations, including a phenothiazine-hexachlorethane-di-*n*-butyl tin dilaurate formulation, were presented, and it was shown that up to the end of May there were in certain herds significant reductions in the warble larvae counts. In other herds the reductions were slight, which, it was felt, indicated that the optimal time of dosing might have been missed. A noteworthy feature was the complete absence thus far of warbles in the animals dosed during the winter of 1952-53, but not during that of 1953-54, despite a high incidence of infestation among undosed controls. Plans were made to extend the trials during 1954-55, employing a more comprehensive dosing period and if possible co-ordination of the British observations with those in Belgium, the Netherlands, Western Germany and Eire.

A survey conducted from the West of Scotland Agricultural College indicated that whereas some 67 per cent. of warble larvae collected from Scotland were *Hypoderma lineatum*, only about 1 per cent. of those collected in England were of this species. These data were based upon 50 larvae collected monthly during March-June from home-bred cattle in several counties, together with any found during the remainder of the year. Cattle of every age from one year to 10 years were found to be infested.

From the Netherlands a report was presented of experiments designed to indicate whether or not dressing of cattle with either creoline or derris before the animals are turned out to grass in spring would prove effective, unfortunately with negative results. From Western Germany it was reported that attempts to control warble larvae on the pasture had proved unsuccessful, but that preliminary observations on the regular spraying of infested cattle with various insecticidal preparations had given most promising results, and further work on these lines (employing dicophane, benzene hexachloride, chlordane and toxaphene) was in progress. Attempts to kill the warble larvae through the oral administration of either benzene hexachloride or a phenothiazine-hexachlorethane mixture, or by the injection of aldrin or dieldrin, had not been successful.

Further observations made in France on the infestation of bovine oesophagi with *H. lineatum* larvae showed a peak incidence during December, with, however, evidence of larvae from June to the following February inclusive. The results of dosing warble-infested cattle with trypanocidal compounds were complicated by toxic reactions.

SUCCESSFUL TRANSPLANTATION OF SHEEP'S OVA

These pictures show the results of the first successful transplantation of sheep's ova ever to be achieved in this country. The work was undertaken both for its own sake and to further a study of the effect of maternal influence on body-size, and subsequent growth, of the offspring.

The outcome—pure-bred lambs out of ewes of a different breed—involved the co-operation of a team of three research workers at the A.R.C. Unit of Animal Reproduction, School of Agriculture, Cambridge. The veterinary member of the team (at whose invitation the writer of this note was able to see the lambs and have them photographed) carried out the surgical work necessary for obtaining the ova and implanting them, on behalf of the member concerned with the study referred to above. Identification and manipulation of the ova was carried out by the third member of the team.

G. P. W.

TWIN LAMBS WITH DIFFERENT MOTHERS: These are pure-bred Welsh lambs, twins conceived by the same Welsh ewe, but each born to different Border Leicester ewes—the "host-mothers" as opposed to the real mother—following transplantation of the latter's eggs. (Sport & Country photographs).

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WELSH EWE HAS BORDER LEICESTER LAMB: One egg was removed from the Border Leicester ewe and transplanted into the Welsh ewe, the other was left in the Border Leicester ewe. Result: twins born of two different mothers, one a host-mother of another breed, the other the mother in every sense. The lamb born to the smaller (Welsh) ewe weighed 2.5 lb. less at birth than the other twin.

VICTORIA VETERINARY BENEVOLENT FUND

57th ANNUAL GENERAL MEETING

The 57th Annual General Meeting of the Victoria Veterinary Benevolent Fund (the 36th Annual General Meeting since incorporation) was held at 10, Red Lion Square, London, W.C.1, on Tuesday, June 1st.

There were present: Dr. L. G. Anderson, Mr. G. H. Arthur, Capt. J. R. Barker, Professor T. J. Bosworth, Mr. H. W. Dawes, Major J. J. Dunlop, Professor C. Formston, Messrs. G. N. Gould, H. Holroyd, O. G. Jones, Miss J. O. Joshua, Professors H. G. Lamont and J. McCunn, Capt. T. M. Mitchell, Professor W. M. Mitchell, Dr. R. F. Montgomerie, Capt. R. N. Phillips, Mr. E. L. Piatkowski, Professor C. W. Ottaway, Mr. J. D. Peele, Professor L. P. Pugh, Messrs. J. N. Ritchie, R. H. Smythe, Major H. Sumner, Mr. J. F. D. Tutt, Profesor W. L. Weipers, Mr. J. B. White, Professor G. H. Wooldridge, Dr. W. R. Wooldridge and Mr. A. J. Wright.

The Secretary (Mr. C. W. Francis) said it was his very sad duty to report the passing of the President, Professor J. B. Buxton, on May 25th, at Streatley. In the circumstances it would be necessary to appoint a Chairman, and under the Articles of Association one of the Vice-Presidents should be appointed. On the motion of Professor L. P. Pugh, seconded from the body of the meeting, Mr. H. W. Dawes was appointed Chairman and took the chair.

The Chairman said: As Chairman *pro tem.* my first and sad duty is to refer to the great loss this Fund has suffered by the unexpected death of its President, Professor Buxton. Many of you who have worked for this Fund for years have realised the devotion which Professor Buxton brought to it and the enormous amount of work he did. I had the pleasure of knowing Professor Buxton for many years and of working with him as one of your executive officers on the Council. There is not one of us in this room—or outside this room—who does not feel a personal loss. You will wish me, as your Chairman, to instruct our Secretary to write a letter to Mrs. Buxton and her family expressing the condolence of this meeting. Members then stood in silence as tribute to Professor Buxton's memory.

Minutes

The Minutes of the previous Annual General Meeting having been published were taken as read and signed.

Election of Officers

Professor L. P. Pugh proposed, and Professor C. W. Ottaway seconded, that Mr. Harold Dawes be appointed President. This was carried unanimously and with acclamation.

The following Vice-Presidents were then re-elected: Mr. G. P. Male, Professor L. P. Pugh, and Professor G. H. Wooldridge, with the addition of Capt. T. M. Mitchell. Major J. J. Dunlop was re-elected Hon. Secretary for the ensuing year.

Hon. Treasurer

The President then suggested that a new hon. treasurer be appointed, as he felt he could not continue to hold that office in addition to the Presidency. Professor W. M. Mitchell proposed that Professor J. McCunn be appointed Hon. Treasurer and this proposal was carried unanimously.

Annual Report and Accounts

In presenting the Annual Report and Statement of Accounts the President said, in the course of his remarks: "I am sure this Annual General Meeting will agree with me in expressing our gratitude to the Ladies' Guild and to other donors to the Fund. The work of the Ladies' Guild is so outstanding that I think we should express our gratitude in a special way. (Applause.) You will be pleased to know that there has been a small increase in the amount received in the collecting boxes, also an increased subscription list, which, of course, includes a certain amount of contributions from the Ladies' Guild and from the Veterinary Medical Association of Ireland. You will wish me to say once more how very pleased this Fund is at the amount of interest taken in Ireland. It is very gratifying to me as one of the Executive Officers that our Irish colleagues during the last 12 months should have so ably supported this Fund. It is something we are very glad to see."

Professor G. H. Wooldridge said: "There is one point I should like to add to what you have said. You have spoken of our gratitude to the Ladies' Guild again this year, but I should also like to refer to the increased assistance we have been receiving from Ireland. This is very gratifying, and I know that the members of the Fund in Ireland have got the matter very much at heart. I should also like to add a word of appreciation of the wonderful work that has been done on behalf of the Fund in Scotland. Various functions have been held at which money has been raised on behalf of the Fund. One other body I should like to include in our appreciation, and that is our student body. They have recently taken a keener interest than they used to do, and we should let them know of our great appreciation of their help and our hope for further assistance to come."

On the motion of Mr. G. N. Gould, seconded by Major J. J. Dunlop, the Report and Accounts were adopted.

Election of Two Members to Serve on the Council

The President said there were two vacancies to be filled on the Council. After Professor Bosworth had asked that his name be withdrawn as a possible candidate Professor R. Lovell, and Mr. J. N. Ritchie were elected unanimously.

IN PARLIAMENT

Amendments to the Slaughterhouses Bill

During the Third Reading of the Slaughterhouses Bill, when various Amendments were discussed, Mr. Robens said:—

"I wonder whether the Minister feels that this Bill provides him with all the necessary authority and power to persuade local authorities to be fairly uniform in the application of by-laws in relation to these new slaughterhouses. The right hon. and gallant Gentleman will remember that we had a short discussion lasting about an hour or an hour and a quarter, on this very point when we were discussing an Amendment which sought to lay down certain minimum standards which the Institute of Sanitary Engineers had produced. Those men who are responsible for inspection are people of whom we should take some notice. The Minister did not disagree that some standards were necessary, but he did not feel that he could lay down national standards which would lay a statutory obligation upon local authorities. That being the case, may I ask the Minister—or the Parliamentary Secretary, whom I presume will reply at the end of what need only be a short debate—what the intentions are with regard to this very large number of new slaughterhouses which are to be licensed, which have not been used for many years and where conditions cannot be as we would like them.

"What does he intend to do? He really has a responsibility. The new Food and Drugs Bill will presumably be coming before the House very shortly. It will be concerned with very much higher standards of hygiene in relation to food handling. Here, in the slaughterhouse, could be the origin of a good deal of evil

with regard to the health of the nation. I know that, in another capacity, the Parliamentary Secretary will be one of the first to want from the hygienic point of view a very strict examination of slaughtering. That means that the necessary facilities must be provided and that there should be no escape from certain essentials.

"At the moment, local government responsible for the licensing of slaughterhouses has the responsibility for making its own by-laws. It has also had guidance from the Ministry of Food and from previous Ministries of Health and other Ministries responsible for public health as long as 40 years ago. That guidance is very old now and certainly does not meet modern conditions. I therefore wonder if the Minister, if it is not within his own responsibility, would consult with his colleague whose responsibility it may be—the Minister of Housing and Local Government or the Minister of Health, I am not quite sure which—as to whether new guidance should not be sent out. I think it would be very useful.

"The last guidance was given some 20 years ago and that, I think, was based on some memoranda of 40 years ago. It must be out of date. I am sure that the Minister of Health must feel the very heavy responsibility he has, because so much damage can be done to the health of the nation if the inspection is not done adequately or sufficiently. It may mean recruitment of more sanitary inspectors. It certainly means better guidance to local authorities. If it is not within the power of the right hon. Gentleman or of his Ministry, I would strongly urge him to consult with his appropriate ministerial colleague with a view to sending fresh guidance to local authorities. I am sorry he could not see his way to putting it into the Bill. However, that is not a matter which we can now discuss. I plead with him to look again to see whether it would not be useful to send guidance to local authorities in relation to the essentials of the slaughterhouse."

Further to the same topic, Mr. Wigg, after referring to pre-war conditions, went on to say:—

"I should have thought that when the Government set about reflecting on the problem which would arise from the decontrol of meat and the release of rationing, they would be faced with the problem of the effective control of slaughterhouses. This evening there was a second manuscript amendment to be moved, and I would be out of order if I said anything about it, but it is a fact that in Scotland there is a movement to bring all slaughterhouses under public control. If they were under public control the sanitary inspector would have responsibility for observing these provisions and would be able to keep an eye on what was going on. I should have thought that we would have had a statement from the Minister of the considerations which led the Government to accept municipal control in Scotland but in England to adopt a contrary policy.

"I can only hope that the Government will be courageous enough, if they find that the malpractices of the pre-war years again begin to emerge, not to hesitate to come back to the House of Commons and ask for an amending Bill. I should have thought the Government would have known of these cases, and would have come to the House and said that they knew about them, and that they existed before the war. The Minister of Health and his advisers know only too well, because what I am saying is to be found in the reports of the medical officers of health in all parts of the country. This practice of the sale of diseased meat to the public went on on a widespread scale right up to the outbreak of the war, and it was one of the few blessings that came out of the war that it was stopped."

Mr. Harold Davies, referring to the rôle of the veterinary surgeon as he saw it, said:—

"The final point which I wish to make is one in which I have been interested for years. The very first Question that I put on the Order Paper when I had the privilege and honour of coming to the House to represent the Leek Division asked the then Minister of Agriculture whether he was prepared to investigate the possibility of establishing a national veterinary service on lines similar to those of the present National Health Service. That question is relevant to this Bill. A national veterinary service would be needed to check up on private and public slaughterhouses in this advanced age of hygienic food distribution. The rôle of the veterinary surgeon in the inspection of slaughterhouses is underestimated.

"I am delighted to find that some progressive local authorities, such as those at Birmingham, Newcastle and elsewhere, have advocated that there should be some kind of national organisation for inspection, with veterinary surgeons having the responsibility of guaranteeing the standards of health and cleanliness of the slaughterhouses."

In his reply to the various points raised, Dr. Charles Hill, Parliamentary Secretary to the Ministry of Food, said:—

"I think that it will be agreed that of the points raised the most important was that raised earlier in this debate on the Third Reading by the right hon. Member for Blyth (Mr. Robens)—public health precautions in slaughterhouses. He asked what the position would be. May I remind him that, as matters stand, the position will be protected by local authorities on the basis of Section 13 of the Food and Drugs Act, 1938, on the basis of the meat regulations made under Section 8 of that Act, and also—and here I come closer to the point which so disturbed him—on the basis of new model by-laws which are now under consideration and which we hope shortly will be issued."

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Questions

Rabbit Traps

Captain Kerby (July 1st) asked the Minister of Agriculture whether during the interim period before he makes the gin trap illegal, he will give wide publicity to the Caldra system of rabbit netting, and other humane systems of trapping; and when he expects to receive the first report of the committee set up to speed up the adoption of humane traps.

The Minister of Agriculture and Fisheries (Sir Thomas Dugdale): My Department is already bringing this and other humane methods of catching rabbits to the notice of farmers. As regards the second part of the Question, the work of the proposed committee will largely depend on trials of new and improved traps in the field, which cannot begin until the autumn. An early report cannot therefore be expected.

Mr. E. L. Mallalieu: Would the Minister say whether it is the policy of Her Majesty's Government to try to eliminate rabbits, and, if so, whether he will agree that no policy of trapping is likely to achieve that end, and that the only hope is to have an all-out drive on a national scale, with gassing and all other suitable means, during the period of grace which myxomatosis may give us, when the rabbit population will be down to a minimum?

Sir T. Dugdale: It is very much the intention of Her Majesty's Government to do all they can to eliminate rabbits, but every method must be tried and used. I do not think that the matter can be dealt with by Question and answer, but trapping, gassing and every other means must be tried to reduce the menace.

Mr. Swingler (July 2nd) asked the Minister of Agriculture why he estimates it will take as long as four years or so to increase the supplies of suitable humane traps as to enable him to prohibit the sale and use of gin traps; and if he will take steps to shorten this period.

Sir T. Dugdale: In my judgment existing humane traps have not shown the all-round efficiency that would justify banning the use of the gin trap. Trials of new and improved traps can only be conducted during the trapping season, which lasts for six or seven months. I am satisfied that at least two seasons will be required to try out new and improved designs of traps. This work will be speeded up and assisted by the Humane Traps Advisory Committee, which the Secretary of State for Scotland and I are proposing to appoint. If, as we hope, after two trapping seasons satisfactory alternative traps have been developed, two further trapping seasons will be needed to allow for their mass-production and distribution, and for those concerned to become proficient in their use before the gin trap is prohibited. I am satisfied we cannot shorten the period; and that we shall do well if humane traps of proved all-round efficiency are made generally available in the time we have set ourselves.

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Myxomatosis

Major Anstruther-Gray (July 1st) asked the Minister of Agriculture whether there has been any further spread of the rabbit disease of myxomatosis during the last fortnight; and what is the most northerly outbreak reported up to date.

Sir T. Dugdale: During the past fortnight there has been some spread of the disease in the areas already affected and isolated outbreaks have been confirmed in wild rabbits in Devonshire, Cardiganshire, Oxfordshire, Buckinghamshire, Berkshire and Lincolnshire (Lindsey). The most northerly outbreaks reported to date are in Anglesey and Lincolnshire (Lindsey).

Mr. Noel-Baker: Has the right hon. Gentleman yet decided whether he is in favour of the spread of the disease or against it?

Sir T. Dugdale: I stand exactly where I stood originally after I got the Report of the Committee which investigated the problem. We are against the artificial spread of the disease. What we have decided is that, where the disease is in existence, we cannot take measures to stamp it out. We are quite convinced of that at the present time. We have no positive evidence whatever of outbreaks having been started deliberately by individuals, as has been written in the Press.

NOTES AND NEWS

Diary of Events

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July 14th.—Annual General Meeting of the Lincolnshire and District Division, B.V.A., at the George Hotel, Grantham, 2.30 p.m.

July 15th.—Annual General Meeting of the Northern Region of the A.V.T. and R.W.s at the Veterinary Science Division, Boot's Pure Drug Co. Ltd., The Priory, Thurgarton, Notts, 12 noon.

July 16th.—Meeting of the Biochemical Society in the Department of Biochemistry, Queen's University, Belfast, 11 a.m.

July 23rd.—Meeting of the Yorkshire Division, B.V.A., in the Government Buildings, Crosby Road, Northallerton, 2.30 p.m.

July 28th.—Meeting of the Supplementary Veterinary Division, B.V.A., at 7, Mansfield Street, Portland Place, London, W.1, 2 p.m.

Sept. 19th—25th.—72nd Annual General Meeting and Congress of the British Veterinary Association at Torquay.

* * * * *

July Meetings of Council and Committees, B.V.A.

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11.0 a.m. Organising Committee.
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10.30 a.m. Council Meeting.
At the Connaught Rooms, Great Queen Street, W.1.

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PERSONAL

R.A.V.C. Postings.—Since March 31st, 1954, Privates J. George and D. Grattan have been serving with No. 5 Army Guard Dog Unit, R.A.V.C., Benghazi, Cyrenaica.

Ministry of Agriculture, Veterinary Field Staff.—Mr. J. L. Buckingham, M.R.C.V.S., Veterinary Officer, has been transferred from Shrewsbury to Peterborough, and the following members have been appointed to the permanent staff of the Ministry: Messrs. J. Aitken, M.R.C.V.S. (stationed at Shrewsbury), P. E. Curtis, B.V.Sc., M.R.C.V.S. (stationed at Gloucester), J. I. Davies, M.R.C.V.S. (stationed at Lincoln).

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R.C.V.S. OBITUARY

Aulton, Reginald Morley (Captain late R.A.V.C.), of 232, Washway Road, Sale, Cheshire. Graduated London, December 22nd, 1910. Died July 3rd, 1954: aged 68 years.

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ROYAL COLLEGE OF VETERINARY SURGEONS

June/July, 1954, Examinations

List of Successful Candidates

London:

Second Examination:

Physiology only.—Baker, K. P.; Bousfield, W. E. D.; Butler, B. C.; Byrne, G. A.; Chappell, L. A.; Clark-Lewis, A. V.; Holland, William; Hughes, J. R.; Lawrence, B. T.; McKie, Miss N. M. C. E.; Nettleton, L. B.; Osman, B. D.; Robbins, G. R.; Tanner, J. A.; Wilkinson, John.

Anatomy only.—Cullinane, J. A.; Howse, J. N.; May, J. N. T.; Owen, D. P.

Third Examination:

Hygiene only.—Blaxland, D. R.; Cameron, R. S.; Fairhall, D. C.; Gray, C. G.; Millar, J. A.; Pocock, E. W.; Rutherford, L. H. (credit); Strang, R. D.; Sutton, J. B.; White, Frederick.

Pathology only.—Ahmad, Saeed; Baxter, C. J.; Beddows, A. C. L.; Bedson, I. F.; Bowles, Jeffery; Brazier, J. F. H.; Coryn, H. D. (credit); Derbyshire, J. B. (credit); Dier, B. G. F.; Down, B. C. (credit); Evans, E. D.; Finn, C. A.; Gray, John; Gulati, Jaint; Heptinstall, Jack; Hudson, J. R.; Hyde, Miss K. B.; James, P. H.; Jones, T. H.; Kearns, M. P.; Kerry, J. B.; Lifton, J. M.; Markham, Keith; Naylor, D. C.; Norman, D. A.; Orham, Ahmet; Pandit, C. N.; Pigott, R. C. C.; Rawson-Shaw, Miss E. A.; Shrimpton, D. F.; Simons, M. A. P.; Taylor, E. L. G. (credit); Thurley, T. M.; Townsend, Miles; Vinsen, M. A.; Wall, L. J. T.; Ward, Anthony (credit); Whitaker, D. L.; Williamson, D. C.; Wilson, Miss E. D.

Final Examination:

Abdel-Baki, Y. Z.; Abraham, B. F.; Ansell, R. H.; Ashoub, M. A. R.; Asthana, V. S.; Baldwin, I. J.; Barton, C. R. Q.; Beesley, C. J. (M); Benbow, G. M.*; Breese, J. L.; Brocklesby, D. W.*; Buxton, Peter; Bywater, J. E. C.; Eden, R. M. G.; Epps, H. B. G.; Fry, N. C. V.; Gibson, F. E. T.; Hammond, Miss W. M.; Hampshire, F. J. W.; Hayes, T. J.; Holmes, R. G.; Hullis, Roy; King, D. K.; Levens-Ing, Miss P. J.; Loving, Charles; McVoy, K. I.; Maynard, H. M. F.; Nestel, B. L.*; Nestel, Mrs. H. M.; Olorenshaw, P. H. (S); Waterlow, Miss Judy; Wells, J. R.; White, R. C.; Wilkins, G. T.

*—denotes 2nd class honours.
(M)—denotes credit in Medicine.
(S)—denotes credit in Surgery.

Liverpool:

Third Examination:

Pathology only.—Bora, Lilaram.

Final Examination:

Shaib, Bukar.

University of Glasgow Veterinary School:

Fourth Examination:

Haresnape, I. C.; Torrance, D. S.

Final Examination:

Berger, Fishel; Taylor, J. W.; Watson, J. D.; Watson, J. M.; West, R. C. A.

University of Bristol Veterinary School:

Fourth Examination:

Sebesta, R. (By-law 95 candidate).

FRENCH VETERINARIAN SEEKS HOSPITALITY

A young French veterinarian, who has just passed his final examination, wishes to see something of practice in this country during the next two months. He would give his services in exchange for pocket-money. Any reader who may be good enough to befriend this young man is asked to write to him direct. He is M. J. A. Kondela, 135, Avenue Clémenceau, Maison Alfort, Paris.

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VETERINARY EXAMINATION OF HORSES ARRIVING FROM IRELAND

The regulations announced last month for the veterinary examination of horses arriving by sea from Ireland came into operation on June 25th.

Arrangements have been made to exempt from this veterinary examination horses from the shows and sales of the Royal Dublin Society if accompanied by a certificate by the Society. As previously announced, horses accompanied by certificates by the Turf Club of Ireland, or by permit issued in advance by the Ministry of Agriculture, will also be exempted.

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FOOT-AND-MOUTH DISEASE—MOVEMENT LICENCES

As from July 1st, livestock may not be moved into a foot-and-mouth disease infected area to any kind of collecting centre or auction, but only to farms and slaughterhouses (including bacon factories) that are not within two miles of an infected place. Licences for movement may be granted only by the local authority for the district into which the livestock are to be sent, and must be countersigned by the local authority of the district from which they are to be despatched.

These arrangements are set out in Articles 3 and 6 of the Foot-and-Mouth Disase (Infected Areas Restrictions) Order of 1938 and Article 6 of the Foot-and-Mouth Disease (Controlled Areas Restrictions) General Order of 1938, which again became operative on July 1st. From that date, when the Ministry of Food ceased to be responsible for the marketing of fatstock, the special procedures authorising the movement under local authority licence of animals to slaughterhouses and bacon factories in foot-and-mouth disease controlled and infected areas, and to collecting centres in infected areas, lapsed.

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THE ROYAL SANITARY INSTITUTE

Papers dealing with the interim report of the Interdepartmental Committee on Slaughterhouses, and a suggested National Meat Inspection Service, were read at sessional meetings of the Royal Sanitary Institute held on June 4th and June 9th.

On the 4th Alderman J. H. Matthews, M.A., J.P., pointed out in opening his paper that the de-rationing of meat created a unique situation for all concerned, and that a new pattern of marketing, distribution and consumption had yet to be established. The high concentration of slaughtering facilities under the Ministry of Food had been dependent on complete control. With the abandonment of this control the estimates of the number of slaughterhouses required must, for the time being, be guesswork. In the speaker's view, amidst conflicting attitudes and interests in meat marketing, local authorities in their provision of public slaughterhouses must operate a policy of open access without discrimination, but they must be assured of a sufficient and steady throughput. The established conception of a public slaughterhouse must be adapted to the conditions prevailing in the large-scale abattoir operating on a line-slaughtering basis.

Alderman Matthews went on to say that local authorities were likely to be reluctant to license old slaughterhouses, as even substantial modernisation was unlikely to remove the objections to most private slaughterhouses and to achieve the standard now required. At the moment a national code of hygiene appeared to him impracticable. Under the position envisaged by the Minister, meat inspection was likely to be less effective.

A general provision of public slaughterhouses of a modern type would substantially raise the standard of meat handling and processing from the farmer to the consumer. To secure the uniformly high standards which were essential local authorities must take a broad view of their responsibilities.

Mr. W. Brennan De Vine, M.C., F.R.C.V.S., D.V.S.M., observed that before 1940 the standard of meat inspection in this country lagged behind the standard adopted by the more progressive continental countries. He was of the view that with the change-over about to take place it would be more difficult to organise regular inspection of all animals, carcases and offals. The elimination of the occasionally used slaughterhouse and the coming into use of larger slaughtering centres would reduce the time of inspection and more readily assist in the detection of animal diseases. No slaughterhouse should be utilised unless ample lairage and isolation boxes were available where the animals could be properly examined.

Mr. De Vine said: "We shall have in some districts, where the local authorities are conscious of the importance of public health, well-run, hygienically kept slaughterhouses; in others, where public health is not considered as urgently important, slaughterhouses and meat inspection may be neglected. Meat is such an important food and its condition as received by the consumer is so wrapped up with public health, that its inspection should be carried out under the control of a Government department and not left to the judgment of individual local authorities. This would raise the standard of meat inspection and tend to bring about uniform conditions throughout the country."

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Mr. Stewart Forrest, M.R.C.V.S., D.V.S.M., addressing the Institute on June 9th, first reviewed the present organisation of the meat inspection service, the personnel involved, and the collection and use of the by-products of the abattoir. He put forward the suggestion that a national meat inspection service should be set up, directed by the Ministry of Health and employing veterinary surgeons and sanitary inspectors as its officers. There should be an increasing co-operation between the meat inspection staffs and the Animal Health Division of the Ministry of Agriculture.

As meat inspection was a specialised branch of the sanitary inspector's work its study, and the subsequent granting of a certificate, should be considered as an additional qualification.

Mr. Forrest advocated a large extension of the use of laboratory aids in the judgment of meat and meat products, together with the economic and hygienic disposal of condemned material and other by-products of the abattoir.

[Readers of the "Record" will note that a number of the opinions expressed by these three speakers were similar in principle to those put forward by the B.V.A. in its own Memorandum on Meat Inspection.]

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ADDRESSES OF DISEASE-INFECTED PREMISES

The list given below indicates, first, the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

ANTHRAX:

Devon.—Land Farm, Membury, Axminster (June 28).

Notts.—Lenton Firs Farm, Lenton Hall Drive, Nottingham (June 28).

FOWL PEST:

Devon.—Cleavewood House, Woolacombe (June 29); Mons Hall, Dolton, Winkleigh (June 30).

Lancs.—6, Moorfield Lane, Scarisbrick, Ormskirk (June 28); Toppins Farm, Tarleton, Preston (June 30).

SWINE FEVER:

Beds.—Hoo Farm, Mantons Lane, Bedford (June 28); Ampthill Road Allotments, Elstow (July 2).

Cambs.—Ascham Road Allotments, Cambridge (June 30).

Sir T. Dugdale: During the past fortnight there has been some spread of the disease in the areas already affected and isolated outbreaks have been confirmed in wild rabbits in Devonshire, Cardiganshire, Oxfordshire, Buckinghamshire, Berkshire and Lincolnshire (Lindsey). The most northerly outbreaks reported to date are in Anglesey and Lincolnshire (Lindsey).

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London:

Second Examination:

Physiology only.—Baker, K. P.; Bousfield, W. E. D.; Butler, B. C.; Byrne, G. A.; Chappell, L. A.; Clark-Lewis, A. V.; Holland, William; Hughes, J. R.; Lawrence, B. T.; McKie, Miss N. M. C. E.; Nettleton, L. B.; Osman, B. D.; Robbins, G. R.; Tanner, J. A.; Wilkinson, John.

Anatomy only.—Cullinane, J. A.; Howse, J. N.; May, J. N. T.; Owen, D. P.

Third Examination:

Hygiene only.—Blaxland, D. R.; Cameron, R. S.; Fairhall, D. C.; Gray, C. G.; Millar, J. A.; Pocock, E. W.; Rutherford, L. H. (credit); Strang, R. D.; Sutton, J. B.; White, Frederick.

Pathology only.—Ahmad, Saeed; Baxter, C. J.; Beddows, A. C. L.; Bedson, I. F.; Bowles, Jeffery; Brazier, J. F. H.; Coryn, H. D. (credit); Derbyshire, J. B. (credit); Dier, B. G. F.; Down, B. C. (credit); Evans, E. D.; Finn, C. A.; Gray, John; Gulati, Jaint; Heptinstall, Jack; Hudson, J. R.; Hyde, Miss K. B.; James, P. H.; Jones, T. H.; Kearns, M. P.; Kerry, J. B.; Lifton, J. M.; Markham, Keith; Naylor, D. C.; Norman, D. A.; Orham, Ahmet; Pandit, C. N.; Pigott, R. C. C.; Rawson-Shaw, Miss E. A.; Shrimpton, D. F.; Simons, M. A. P.; Taylor, E. L. G. (credit); Thurley, T. M.; Townsend, Miles; Vinsen, M. A.; Wall, L. J. T.; Ward, Anthony (credit); Whitaker, D. L.; Williamson, D. C.; Wilson, Miss E. D.

Final Examination:

Abdel-Baki, Y. Z.; Abraham, B. F.; Ansell, R. H.; Ashoub, M. A. R.; Asthana, V. S.; Baldwin, I. J.; Barton, C. R. Q.; Beesley, C. J. (M); Benbow, G. M.*; Breese, J. L.; Brocklesby, D. W.*; Buxton, Peter; Bywater, J. E. C.; Eden, R. M. G.; Epps, H. B. G.; Fry, N. C. V.; Gibson, F. E. T.; Hammond, Miss W. M.; Hampshire, F. J. W.; Hayes, T. J.; Holmes, R. G.; Hullis, Roy; King, D. K.; Levens-Ing, Miss P. J.; Loving, Charles; McVoy, K. I.; Maynard, H. M. F.; Nestel, B. L.*; Nestel, Mrs. H. M.; Olorenshaw, P. H. (S); Waterlow, Miss Judy; Wells, J. R.; White, R. C.; Wilkins, G. T.

*—denotes 2nd class honours.
(M)—denotes credit in Medicine.
(S)—denotes credit in Surgery.

Liverpool:

Third Examination:

Pathology only.—Bora, Lilaram.

Final Examination:

Shaib, Bukar.

University of Glasgow Veterinary School:

Fourth Examination:

Haresnape, I. C.; Torrance, D. S.

Final Examination:

Berger, Fishel; Taylor, J. W.; Watson, J. D.; Watson, J. M.; West, R. C. A.

University of Bristol Veterinary School:

Fourth Examination:

Sebesta, R. (By-law 95 candidate).

FRENCH VETERINARIAN SEEKS HOSPITALITY

A young French veterinarian, who has just passed his final examination, wishes to see something of practice in this country during the next two months. He would give his services in exchange for pocket-money. Any reader who may be good enough to befriend this young man is asked to write to him direct. He is M. J. A. Kondela, 135, Avenue Clémenceau, Maison Alfort, Paris.

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VETERINARY EXAMINATION OF HORSES ARRIVING FROM IRELAND

The regulations announced last month for the veterinary examination of horses arriving by sea from Ireland came into operation on June 25th.

Arrangements have been made to exempt from this veterinary examination horses from the shows and sales of the Royal Dublin Society if accompanied by a certificate by the Society. As previously announced, horses accompanied by certificates by the Turf Club of Ireland, or by permit issued in advance by the Ministry of Agriculture, will also be exempted.

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FOOT-AND-MOUTH DISEASE—MOVEMENT LICENCES

As from July 1st, livestock may not be moved into a foot-and-mouth disease infected area to any kind of collecting centre or auction, but only to farms and slaughterhouses (including bacon factories) that are not within two miles of an infected place. Licences for movement may be granted only by the local authority for the district into which the livestock are to be sent, and must be countersigned by the local authority of the district from which they are to be despatched.

These arrangements are set out in Articles 3 and 6 of the Foot-and-Mouth Disase (Infected Areas Restrictions) Order of 1938 and Article 6 of the Foot-and-Mouth Disease (Controlled Areas Restrictions) General Order of 1938, which again became operative on July 1st. From that date, when the Ministry of Food ceased to be responsible for the marketing of fatstock, the special procedures authorising the movement under local authority licence of animals to slaughterhouses and bacon factories in foot-and-mouth disease controlled and infected areas, and to collecting centres in infected areas, lapsed.

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THE ROYAL SANITARY INSTITUTE

Papers dealing with the interim report of the Interdepartmental Committee on Slaughterhouses, and a suggested National Meat Inspection Service, were read at sessional meetings of the Royal Sanitary Institute held on June 4th and June 9th.

On the 4th Alderman J. H. Matthews, M.A., J.P., pointed out in opening his paper that the de-rationing of meat created a unique situation for all concerned, and that a new pattern of marketing, distribution and consumption had yet to be established. The high concentration of slaughtering facilities under the Ministry of Food had been dependent on complete control. With the abandonment of this control the estimates of the number of slaughterhouses required must, for the time being, be guesswork. In the speaker's view, amidst conflicting attitudes and interests in meat marketing, local authorities in their provision of public slaughterhouses must operate a policy of open access without discrimination, but they must be assured of a sufficient and steady throughput. The established conception of a public slaughterhouse must be adapted to the conditions prevailing in the large-scale abattoir operating on a line-slaughtering basis.

Alderman Matthews went on to say that local authorities were likely to be reluctant to license old slaughterhouses, as even substantial modernisation was unlikely to remove the objections to most private slaughterhouses and to achieve the standard now required. At the moment a national code of hygiene appeared to him impracticable. Under the position envisaged by the Minister, meat inspection was likely to be less effective.

A general provision of public slaughterhouses of a modern type would substantially raise the standard of meat handling and processing from the farmer to the consumer. To secure the uniformly high standards which were essential local authorities must take a broad view of their responsibilities.

Mr. W. Brennan De Vine, M.C., F.R.C.V.S., D.V.S.M., observed that before 1940 the standard of meat inspection in this country lagged behind the standard adopted by the more progressive continental countries. He was of the view that with the change-over about to take place it would be more difficult to organise regular inspection of all animals, carcases and offals. The elimination of the occasionally used slaughterhouse and the coming into use of larger slaughtering centres would reduce the time of inspection and more readily assist in the detection of animal diseases. No slaughterhouse should be utilised unless ample lairage and isolation boxes were available where the animals could be properly examined.

Mr. De Vine said: "We shall have in some districts, where the local authorities are conscious of the importance of public health, well-run, hygienically kept slaughterhouses; in others, where public health is not considered as urgently important, slaughterhouses and meat inspection may be neglected. Meat is such an important food and its condition as received by the consumer is so wrapped up with public health, that its inspection should be carried out under the control of a Government department and not left to the judgment of individual local authorities. This would raise the standard of meat inspection and tend to bring about uniform conditions throughout the country."

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Mr. Stewart Forrest, M.R.C.V.S., D.V.S.M., addressing the Institute on June 9th, first reviewed the present organisation of the meat inspection service, the personnel involved, and the collection and use of the by-products of the abattoir. He put forward the suggestion that a national meat inspection service should be set up, directed by the Ministry of Health and employing veterinary surgeons and sanitary inspectors as its officers. There should be an increasing co-operation between the meat inspection staffs and the Animal Health Division of the Ministry of Agriculture.

As meat inspection was a specialised branch of the sanitary inspector's work its study, and the subsequent granting of a certificate, should be considered as an additional qualification.

Mr. Forrest advocated a large extension of the use of laboratory aids in the judgment of meat and meat products, together with the economic and hygienic disposal of condemned material and other by-products of the abattoir.

[*Readers of the "Record" will note that a number of the opinions expressed by these three speakers were similar in principle to those put forward by the B.V.A. in its own Memorandum on Meat Inspection.*]

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ADDRESSES OF DISEASE-INFECTED PREMISES

The list given below indicates, first, the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

ANTHRAX:

Devon.—Land Farm, Membury, Axminster (June 28).

Notts.—Lenton Firs Farm, Lenton Hall Drive, Nottingham (June 28).

FOWL PEST:

Devon.—Cleavewood House, Woolacombe (June 29); Mons Hall, Dolton, Winkleigh (June 30).

Lancs.—6, Moorfield Lane, Scarisbrick, Ormskirk (June 28); Toppins Farm, Tarleton, Preston (June 30).

SWINE FEVER:

Beds.—Hoo Farm, Mantons Lane, Bedford (June 28); Ampthill Road Allotments, Elstow (July 2).

Cambs.—Ascham Road Allotments, Cambridge (June 30).

Ches.—Victoria Bungalow, Wincham; 29, Chapel Street, Wincham, Northwich (June 29); Garden Cottage, Belmont Hall, Gt. Budworth, Northwich (July 2).

Denbighs.—Wood Cottage, Gresford, Wrexham (June 30).

Devon.—Gabber Farm, Downs Thomas, Plymouth (June 28).

Dunbarton.—The Hough Piggery, Gartocharn, Alexandria (June 28).

Essex.—" Sunnymead," Eastwood Rise, Eastwood, Southend-on-Sea (June 28); Garlands Farm, Mundon, Chelmsford (July 2).

Gloucs.—Little Berryhill Farm, Coleford (June 28).

Herts.—Meadowcroft Farm, Orwell, Royston (June 30).

Hunts.—Taylors Farm, Ramsey (June 30).

Kent.—Shirrenden, Horsmonden, Tonbridge (July 2).

Lancs.—Warren Farm, Ainsdale, Southport (June 30); Platts Farm, Whelley, Wigan; Pyes Farm, Moss Lane, Lydiate, Maghull, Liverpool; Railway View Farm, Golborne, Warrington (July 1).

Lincs.—Halls Farm, Fen Road, Holbeach, Spalding (July 1).

Montgomery.—Tyddyn-y-Sais, Bwlchycibau, Llanfyllin (June 30).

Norfolk.—Fritton Farm, Ludham, Great Yarmouth (July 1).

Notts.—Furze Poultry Farm, Kirton, Newark; Turnpike Farm, Hickling Pastures, Melton Mowbray (June 29).

Salop.—Lower Waen, Maesbury, Oswestry (June 30); Beobridge, Claverley (June 30).

Staffs.—Yew Tree Farm, Wharf Road, Biddulph, Stoke-on-Trent (June 30).

Suffolk.—Hill Farm, Barnardiston, Haverhill (June 29).

Sussex.—Cooksbridge Farm, Fernhurst, Haslemere (June 28); Lottbridge Drove, Eastbourne (July 2).

Warwicks.—Brickfields, rear of Crown Inn, Monkspath, Shirley, Solihull (July 1).

Worcs.—Lower House Farm, Chaddesley Corbett, Kidderminster (June 28); Manor Farm, Church Lench, Evesham (June 30).

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the B.V.A.

APPOINTMENTS IN NEW ZEALAND

Sir,—As one who came out to New Zealand, and commenced in Club practice at about the same time as Mr. J. A. Toovey, may I be permitted to reply to his criticisms?

I do not dispute the facts as stated by Mr. Toovey, although both salaries and car mileage allowance have been increased recently. But he has chosen to stress all the disadvantages and to mention none of the advantages. The cost of living may be a little higher, but nevertheless I enjoy a very much higher standard of living than I did at home.

The control of the profession by lay persons sounds a most scandalous thing, but in actual fact it means that Club Executives, all farmers, eliminate all business worries, book-keeping, debt collecting, etc., and leave one free to devote all one's time to professional duties. I personally have suffered far less control out here than I did at home as an assistant under the eagle eye of the proprietor of the practice, or as an L.V.I. under the bureaucratic supervision of the Ministry of Agriculture.

I also enjoy tremendously my month's holiday spent in a wonderful climate in a country where every conceivable form of outdoor sport is freely available to all.

I also find most stimulating my annual visit to a veterinary conference with all my expenses (including, if necessary, air travel) paid. At these conferences I meet and exchange ideas not only with my own colleagues but also with all the most prominent research workers and veterinary teachers both from this country and overseas. How many junior practitioners enjoy this privilege at home?

Finally, if I am dissatisfied with conditions in Club practice, I am free to start private practice in a country which is desperately short of veterinary surgeons and where the only capital outlay required is a car and a set of instruments.—Yours faithfully, H. P. Skyrme, Te Awamutu Veterinary Association, P.O. Box 52, Te Awamutu. *June 18th*, 1954.

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POULTRY HUSBANDRY

Sir,—In reply to Dr. Blount's letter in your issue of June 19th, I would inform him that it was the wish of the Association of Veterinary Teachers and Research Workers that poultry be included as one of the subjects for the recently held symposium on " The Place of Veterinary Science in Animal Husbandry," but for reasons beyond their control this was not possible.

Dr. Blount kindly offers us the benefit of the doubt in the reason for our omission, and the suggestion that poultry husbandry, in its widest concept, should form the subject of a future meeting of the Association will, I am sure, be seriously considered by our members.—Yours faithfully, C. W. Ottaway, Hon. Secretary, Association of Veterinary Teachers and Research Workers, Department of Veterinary Anatomy, University of Bristol, Bristol 8. *June 28th*, 1954.

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EXPENSIVE DRUGS

Sir,— I fully endorse the remarks made by Dr. W. M. Scott in your issue dated June 19th. At a recent meeting held here of the local branch of the B.M.A. a warning was given by the President on the indiscriminate use of antibiotics.

It is a rather ironical fact that whilst the pig can have added to its food any antibiotics it requires, neither doctor nor veterinary surgeon can have aureomycin in this country for the treatment of disease, and it enabled me, following the report of this meeting in the local paper, to endorse the remarks made, and to inform anyone who owns pigs to be guided by his veterinary surgeon before starting to feed antibiotics to them. My own personal opinion is that in the case of penicillin it should only be fed to " runt " pigs and to piglets suffering from scour. To give it more or less *ad lib.* to thriving pigs is, in my view, a mistake.

The high cost of drugs is an ever-pressing headache, and the makers might consider supplying to both doctor and veterinary surgeon at the same scale of charges as they do to the chemist.

The art of healing would not suffer unduly if our research chemists took a holiday of two to four years. This would enable all of us to assess the value of the remedies offered to date.

We have a galaxy to choose from, and whilst so many drugs by their action bring down the temperature, it by no means infers that in cases such as of pneumonia there is a corresponding improvement in the lung.—Yours faithfully, J. F. D. Tutt, " Rothiemurchus," St. Cross, Winchester. *June 26th*, 1954.

DISEASES OF ANIMALS ACT, 1950—GREAT BRITAIN

Summary of Returns of Confirmed Outbreaks of Scheduled (Notifiable) Diseases

Period	Anthrax	Atrophic Rhinitis	Foot-and-mouth	Fowl Pest	Sheep Scab	Swine Fever
1st to 15th June, 1954 ...	8	2	—	16	—	78
Corresponding period in—						
1953 ...	19	—	—	96	—	153
1952 ...	19	—	63	5	—	31
1951 ...	14	—	—	6	—	55
1st January to 15th June, 1954	144	3	12	528	—	721
Corresponding period in—						
1953 ...	414	—	25	373	—	1,623
1952 ...	262	—	365	114	1	530
1951 ...	250	—	18	476	4	428